AL.1.1174 c.2

Students
First !

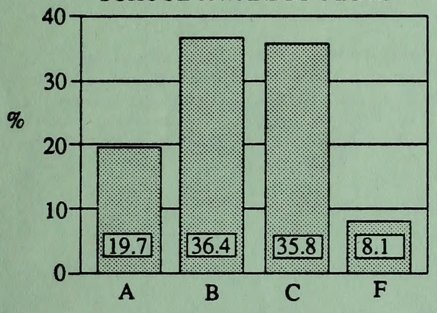
Student Evaluation and Records

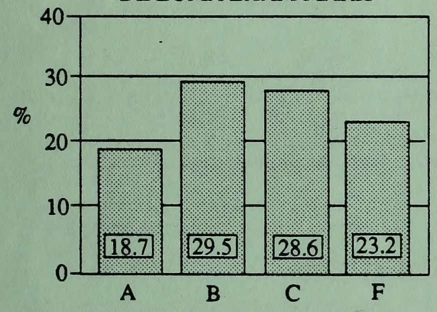
EXAMINER'S REPORT
JANUARY
1990

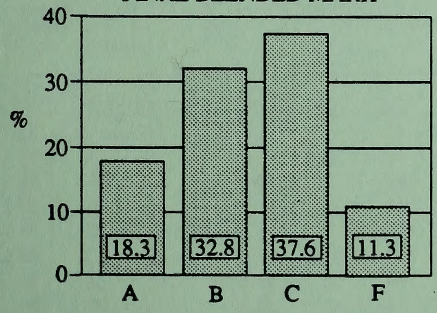
CANADIANA

APR 25 1990

Biology 30 Diploma Examination Results


SCHOOL-AWARDED MARK


DIPLOMA EXAM MARK


FINAL BLENDED MARK

The summary information in this report is intended to provide teachers, school administrators, students, and interested others with an overview of results from the January 1990 administration of the Biology 30 Diploma Examination. The information will be most useful when teachers and administrators use it in conjunction with the detailed school and jurisdiction reports that have been mailed to school jurisdiction offices. An annual provincial report containing a detailed analysis of the combined January and June results will be distributed in the fall of 1990.

DESCRIPTION OF THE EXAM

The Biology 30 Diploma Examination consists of two parts: a multiple-choice section of 70 questions worth 70% of the total, and a written-response section of seven questions worth 30% of the total.

ACHIEVEMENT OF STANDARDS

The information reported is based on the final blended marks achieved by 8 113 students who wrote the January 1990 Biology 30 Diploma Examination.

- 88.7% of these students achieved the acceptable standard (a final blended mark of 50% or higher).
- 18.3% of these students achieved the standard of excellence (a final blended mark of 80% or higher).

PROVINCIAL AVERAGES

- The average school-awarded mark was 66.7%.
- The average diploma exam mark was 63.1%.
- The average final blended mark, representing an equal weighting of the diploma and school marks, was 65.3%.

Alberta
EDUCATION

SUBTEST RESULTS

When analysing any detailed examination results, please bear in mind that subtest results **cannot** be directly compared.

Machine scored: 68.1%

Written response: 51.1%

- Course Content
  - Cellular Processes: 56.4%
  - Homeostatic Mechanisms: 55.4%
  - Nutrition and Digestion: 62.7%
  - Body Fluids: 58.2%
  - Breathing, Gas Exchange, and Transport: 74.6%
  - Energy Release: 77.8%
  - The Kidney: 54.7%
  - Regulation of the Internal Environment: 61.9%
  - Voluntary Movement and Body Support: 68.1%
  - Human Reproduction: 72.7%

- Process Skills: 59.3%
  - Process skills were evaluated in multiple-choice questions 10, 11, 15, 16, 17, 18, 24, 26, 27, 32, 33, 34, 37, 38, 39, 49, 56, 59, 60, and 64, and written-response questions 1 and 5.
- Cognitive Levels
  - Knowledge: 71.8%
  - Comprehension and Application: 59.0%
  - Higher Mental Activities: 63.0%

EXAMINATION BLUEPRINT

Each question on the examination is classified in two ways: according to the cognitive level demanded by the question and according to the curricular content area being tested. The examination blueprint illustrates the distribution of questions according to these classifications. The numbers in square brackets [ ] indicate written-response questions, and those without brackets indicate multiple-choice questions.

	Questions by Cognitive Level			
Reporting Category	Knowledge	Comprehension and Application	Higher Mental Activities	Examination Emphasis (%)
Cellular Processes	1, 2	[1]	3, 4	9
Homeostatic Mechanisms	5		[2]	4
Nutrition and Digestion	6, 7 [3]	8, 9, 10, 11, 12, 13, 14, 15	16, 17, 18	16
Body Fluids	19, 23	20, 21, 22, 24, 25, 26 [5]	27	15
Breathing, Gas Exchange, and Transport	28, 29, 30	31, 32, 33	34	7
Energy Release	35	36, 37	38, 39	5
The Kidney	40, 41, 42	43, 44, 45 [4]	46	10
Regulation of the Internal Environment	47, 48, 53, 54, 55	49, 50, 51, 52, 57, 58 [6]	56, 59, 60	20
Voluntary Movement and Body Support	61	62, 63	64	4
Human Reproduction	65, 66	68 [7]	67, 69, 70	10
Examination Emphasis (%)	25	55	20	100

RESULTS and EXAMINER'S COMMENTS

The examination has a balance of question types and difficulties designed so that a student capable of achieving the acceptable standard would obtain a mark of 50% or better on the examination. Students achieving the standard of excellence would obtain a mark of 80% or better on the examination.

MULTIPLE CHOICE

QUES.	KEY	DIFF.*	QUES.	KEY	DIFF.	QUES.	KEY	DIFF.	QUES.	KEY	DIFF.	QUES.	KEY	DIFF.
1	C	81.6	15	D	39.8	29	A	79.5	43	A	50.0	57	D	65.7
2	C	64.4	16	A	67.6	30	D	74.5	44	B	67.7	58	A	72.8
3	B	64.2	17	A	76.2	31	C	69.2	45	D	60.7	59	B	78.8
4	B	43.7	18	C	60.5	32	B	78.1	46	C	50.5	60	B	35.2
5	A	74.0	19	D	85.4	33	D	70.1	47	B	70.1	61	C	77.7
6	B	71.6	20	C	72.8	34	C	68.9	48	D	71.9	62	D	56.3
7	C	74.7	21	B	63.3	35	B	80.2	49	A	75.9	63	A	61.4
8	D	51.9	22	C	75.2	36	D	74.9	50	A	65.8	64	C	76.1
9	A	73.5	23	B	49.3	37	B	70.4	51	B	57.0	65	B	71.7
10	D	67.8	24	B	72.3	38	A	76.6	52	C	57.4	66	D	77.2
11	C	51.9	25	A	65.8	39	D	86.2	53	B	78.1	67	C	52.9
12	C	70.2	26	D	54.2	40	A	71.3	54	C	74.3	68	A	85.0
13	B	52.1	27	B	82.5	41	D	75.4	55	C	77.9	69	D	74.3
14	B	75.6	28	D	81.0	42	B	63.2	56	A	41.3	70	B	73.7

*Difficulty -- percentage of students answering the question correctly

MULTIPLE CHOICE (continued)

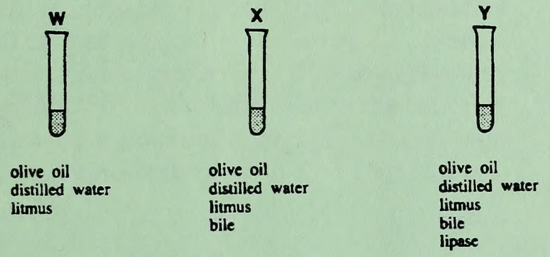
41. The tubules of the nephron help to maintain homeostasis in the body by

A. forming urea
B. removing amino acids
C. collecting filtered proteins
*D. returning material to the blood

Question 41 required an understanding of the basic function and processes of the nephron as it applies to homeostasis (a key biological term). Students achieving at the acceptable standard should know this. The question was answered correctly by 75% of all students with 96% of those students achieving excellence getting it correct.

Use the following information to answer questions 15 and 16.

To investigate the digestion of an organic compound, test tubes W, X, and Y were set up with contents as shown. The pH of the contents of all three test tubes was neutral or adjusted to be neutral at the beginning of the experiment.



Note: Litmus is blue in a neutral or basic solution and red in an acidic solution.

15. When test tubes W, X, and Y are compared, the contents of Test Tube X would most closely simulate (represent) the contents found in the small intestine of a person with

A. gallstones
B. a gastric ulcer
C. normal lipid digestion
*D. a blocked pancreatic duct

Question 15 was intended to be challenging for those students achieving at the standard of excellence. It required students to analyse an experimental design, recall anatomical structures and normal functioning of the digestive system, and then draw a parallel between incomplete test ingredients and abnormal digestive organ function. Many students overlooked the significance of the absence of lipase in tube X; nor did they relate its absence to the function of the pancreas. The question was answered correctly by only 40% of all students but was answered correctly by 75% of those students achieving the standard of excellence.

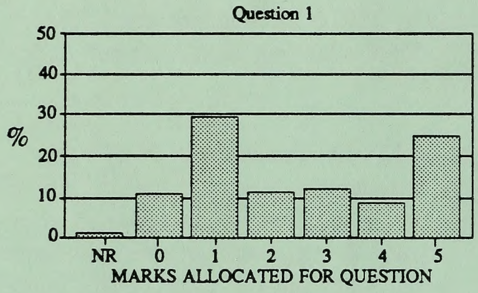
16. After the test tubes and their contents were incubated at 37°C for one hour, it was observed that the contents of Test Tube Y turned red. What caused the pH to change?

*A. Fatty acids
B. Lactic acid
C. Amino acids
D. Nucleic acids

Question 16 required students to interpret results of a laboratory investigation and identify a correct inference. Basic knowledge of nutrient composition and macromolecular digestion was also required. Most students demonstrated a good understanding of the experimental design and the procedure inherent in the investigation. A minority failed to recognize olive oil as a lipid or distinguish between the products of digestion and the wastes of anaerobic respiration. The question was answered correctly by 68% of all students but was answered correctly by 95% of those students achieving the standard of excellence.

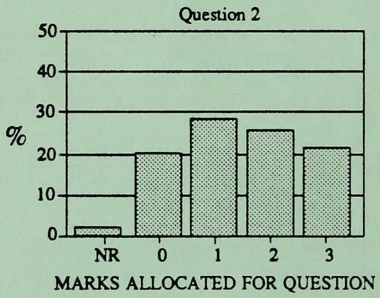
WRITTEN RESPONSE

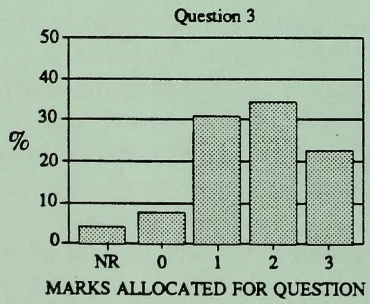
The written-response section of this examination is designed to be challenging for students achieving excellence. A student achieving the acceptable standard should be able to obtain a minimum of two marks for each question.



Question 1: Students' responses to the first two parts of the question indicated that most of them could identify diffusion and osmosis as the concepts illustrated by the laboratory investigation. Good understanding of experimental design was indicated by the responses to part three. The bimodal distribution of marks resulted from about an equal number of students incorrectly predicting mass changes based on the diffusion of salt to those correctly predicting mass changes based on osmosis. Some students lost marks because they confused mass with volume (egg shrank, bloated) or predicted a change in mass without describing the direction. On this 5-mark question, the average mark was 2.53 for 50.6% of the available mark.

Question 2: Students' responses to the first part of the question demonstrated that they have an acceptable understanding of the concept of competitive inhibition. However, responses to the second part revealed that considerable confusion exists between the role of enzymes and the role of antibodies. Bacteria were often described as substrates rather than as organisms in which vital enzyme-facilitated metabolic processes occur. On this 3-mark question, the average mark was 1.47 for 49.0% of the available mark.

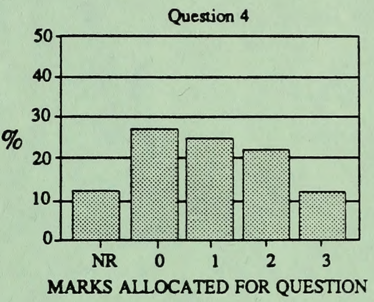


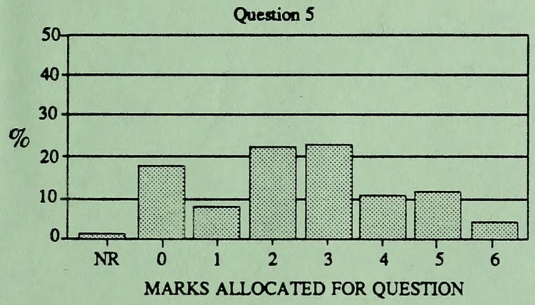


Question 3: Students were required to recall functions of Ca^{2+} and select examples from three different body systems. Students achieving at the acceptable standard were able to provide at least two possible functions; however, some of these students were unable to state how a deficiency in Ca^{2+} would affect the functions identified, e.g., the effect on blood clotting. Students at the acceptable standard also had difficulty identifying the body system to which the process requiring Ca^{2+} belonged. The understanding of biological knowledge required in this question was readily demonstrated by those students who achieved excellence. On this 3-mark question, the average mark was 1.67 for 55.7% of the available mark.

WRITTEN RESPONSE (continued)

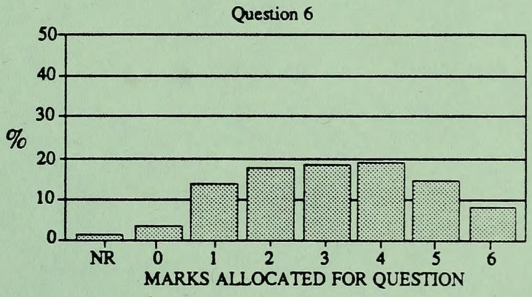
Question 4: Students' responses showed that many of them were unprepared for dealing with the core concept of dialysis. Many students confused the principle on which solute transfer is based in the artificial kidney with the various functions of the real kidney, i.e., force filtration, active transport. Students who did identify diffusion as the main principle went on to describe kidney processes rather than passive regulatory conditions of transfer. On this 3-mark question, the average mark was 1.07 for 35.7% of the available mark.

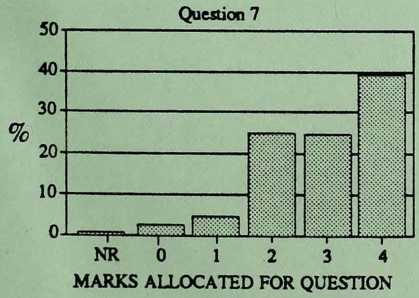




Question 5: The majority of students did not do very well on this question. The scoring included two marks for demonstrating appropriate written communication skills and an additional four marks for demonstrating an understanding of the biological content. Over 70% of the students obtained only one of the two marks for communication. The majority of students obtained only one or two marks for the biological content. Most students failed to provide carefully developed cause and effect relationships. For example, lower body temperature was explained simply in terms of reduced blood flow rather than in terms of a reduced oxygen supply with a subsequent reduction in cellular respiration. Few addressed the reason for the purplish-blue coloration. The fact that oxyhemoglobin is red and reduced hemoglobin is bluish purple was not related to the condition. On this 6-mark question, the average mark was 2.50 for 41.7% of the available mark.

Question 6: Based on their responses, most students appear to have a good understanding of the "fight-or-flight" response. They could identify changes that may occur, but they did not provide enough detail; for example, "heart rate increases to pump more blood to the body." Only the excellent students were able to associate the changes with the emergency as a homeostatic adjustment. Students tended to write for a limited audience (biology teachers), assuming that the correct inferences would be made and the details filled in. On this 6-mark question, the average mark was 3.13 for 52.2% of the available mark.





Question 7: Most students answered this well. To achieve full marks, students had to demonstrate a clear understanding of the differences between eggs and follicles, corpora lutea and follicles, progesterone and estrogen. On this 4-mark question, the average mark was 2.91 for 72.8% of the available mark.

For further information, contact Phill Campbell or Lowell Hackman at Student Evaluation and Records Branch, 427-2948.